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part II: Problems and Limitations

Arler, Finn

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Cost-Benefit Analysis and Ethics

Part II: Problems and Limitations

Finn Arler

Cost-benefit analysis includes a large number of choices and considerations, many of which are controversial or includes a high degree of uncertainty. In complex cases there is room enough for a whole army of devils to move into the details. One of the key principles, which ought to be observed by all analysts, is therefore full disclosure and transparency in order for the conclusions to be tested and assessed by independent observers. Any analyst striving to live up to the previously cited U.S. Office of Management and Budget demand for "*honesty and integrity*" should highlight all potentially controversial or uncertain assumptions. This is particularly important in cases where assumptions are hidden in a specific methodology. Similarly, it is extremely important to present sensitivity tests based on alternative assumptions in relation to all controversial issues that have vital impact on the outcome of the analysis in order to separate robust conclusions from shaky ones.

These principles should be observed even more carefully when analysts address a general public not familiar with cost-benefit analysis. It is quite simply bad practice to present conclusions to the public as if they were the result of pure and unbiased science without mentioning any of the potentially controversial assumptions, which almost always have significant impact on the conclusions.

In this chapter, I will focus on some of the issues which are most likely to cause controversy, and which should therefore be treated with utmost care by analysts as well as by readers and users of cost-benefit analysis. All problems are somehow related to the basic idea of using the (ideal) market as the

basic model and seeing economics as a value-free science apart from one single goal: improving the efficiency of satisfying private preferences by chasing Pareto optimums. I shall exemplify some of the problems related to the extension of market logic and economic calculation beyond the customary limits of the market: putting a price on human lives, on critical and unique resources, and on future costs and benefits. In the concluding part of the chapter, I will discuss the use of cost-benefit analysis more generally.

Monetising non-market goods

Monetising losses of human lives

It is a basic assumption in cost-benefit analysis that all cost and benefits need to be monetised in order to identify the most efficient solution. It is necessary, therefore, to attach economic values even to objects, which are not normally traded on the market. One of most controversial elements is the monetisation of human lives (or of potential losses of human lives).

Basically, there are two ways to approach this issue. On one hand, we have an approach in line with Thomas Hobbes' classical statement that a human being is just one more thing, the utility of which can be valuated on the market: *"The Value, or Worth of a man, is as of all other things, his Price; that is to say, so much as would be given for the use of his Power: and therefore is not absolute; but a thing dependent on the need and judgment of others"* (Hobbes 1651/1968, 152). A person's value is relative to the needs and judgment of others, and these are expressed as willingness to pay in acts of exchange. The market can accordingly provide an objective measure for the valuation of human lives. Hobbes did not distinguish between the value (or worth) of a human being in him- or herself and the value of the use of his or her labour power, and he could therefore quite easily put a price on human beings. The price of a lost human life equals the loss of its labour power in the expected remaining working period (assuming that nobody else is unemployed, capable, and ready to take over).

Obviously, it will have quite significant consequences, if it is generally accepted that the value of human lives depends on the market value of their labour power. For instance, the loss of an African man with a low salary will be much cheaper than the loss of a New York stock exchange gambler with a large income. The loss of an African woman, whose work is not registered on the market, would have no influence at all on the account, because she has an opportunity cost of zero on the labour market. The loss of sick or

elderly people, who live off their pension and maybe are given extensive medical treatment, would even be counted as an economic benefit. However, even though attempts to get rid of these people would be recommendable from a narrowly economic point of view – and worth considering from that of a utilitarian satisfied with counting pain and pleasure – this would be considered a repugnant conclusion from any other ethical point of view.

Opposed to the Hobbesian approach we find the kind of argument, which has been put forward most forcefully by the German philosopher Immanuel Kant: *"Whatever has a price can be treated as an equivalent to other things; that, however, which is raised beyond every price, and therefore cannot be treated as an equivalent, has a worth* [*Würde*]" (Kant 1785/1965). Everything, which can be treated simply as a means to satisfy human needs or wants, has a price or exchange value and can be traded on the market. This includes human labour power, which is traded on the labour market. On the other hand, we cannot ascribe an exchange value to that which has *intrinsic value* or *worth*, and according to Kant this is the privilege of rational (human) beings. Rational beings should never be treated simply as means to satisfy external ends, but always also as ends in themselves.

Slavery, the buying and selling of human beings, was abolished long time ago, and no one would accept that people were allowed to kill each other, if only they paid the market value of the lost labour power. Nor do we, in ordinary situations, see the death of one particular, identifiable (and innocent) person as an acceptable price to pay in order to obtain a certain benefit. This would be the case, for instance, if a medical company or a public hospital picked out somebody with the right genes and inflicting him or her involuntarily with a deadly decease in order to test a new drug, which is expected to help many others. In general, we accept the Kantian argument that human beings (or their flourishing) should never be treated as means only, but always also as *ends in themselves*. In this sense they are priceless (and not, as some economists, who miss the whole point, try to put it in order to defeat it: of infinite value).

At the same time, however, we cannot avoid making decisions, which shorten some people's lives. For instance, we do not spend the major part of our resources in hospitals trying to lengthen the lives of dying people, and even if we did, this would eventually cause deaths somewhere else like, say, on disrepaired roads. Many economists argue that potential losses of human lives are likely to be forgotten in the process of decision making, if we refuse to put a price on them considered of as *statistical lives*. Let us assume for a moment, then, that it does make sense to put a price on (losses of) human lives. What exactly are we putting a price on in this case? Several suggestions have been put forward. Let me concentrate on three main candidates.

The first candidate is the loss of *potential labour power*. This is estimated in the so-called *human capital approach*. In this case, we are faced with the problem of elderly people with a negative price, people who are not related to the labour market, etc. Getting rid of these people would improve net benefit. A hideous conclusion that is, indeed. One way to solve this problem could be to use the average income of an individual midway in a life of average length. This would raise the problem immediately whether we are talking about the average *national* or *global* income and life length. In the first case the loss of human lives in poor countries would be far cheaper than in rich countries, wherefore the riskiest projects would be placed in the lands of the poorest without their previously stated consent. In the second case, the price would be so low that, particularly in rich countries, it would pay very well not to care about the loss of human lives.

Another way of estimating the potential loss of a human life is to estimate the total value of production losses due to mortal accidents and then divide this total value by the number of lost human lives. This method is used, for instance, by the Danish Road Directorate, and recommended by the Danish Ministry of Finance. It leads to a value around €300,000 per "statistical life" (1999-prices) (Vejdirektoratet 2001; Finansministeriet 1999).

However, an account of the loss of potential labour power does not include the losses inflicted on the relatives of a dead person. A second candidate is therefore the loss of potential labour power plus the *pain and sorrow inflicted on relatives*. In this case, however, there are no reliable market based values or prices to refer to. The loss of a spouse, a mother, a son, or a close friend has no true market value. In fact, if somebody asked you what you would consider a fair price for the realisation of a project, which he is about to put to work, and which can be expected to cause the death of your child, you would immediately denounce him to the police.

We could try to move a step away from the specific cases, though, and ask, for instance, how much potential victims and potential relatives of victims would find it equitable to pay to an insurance fund compensating the relatives of possible future (by now unknown) victims of a project, which would be profitable to themselves. A project would be acceptable only if it could actually sponsor a fund of a size, which could compensate relatives to future victims, and still be profitable. This way, it seems, we can calculate an indirect measure of the value of a lost life. In relation to public projects like roads or bridges the compensation of relatives could simply be estimated as that which the political authorities would be willing to pay as compensation, if they had to. This is how the Danish Road Directorate justifies the use in cost-benefit analysis of virtual compensations to relatives around €600,000 per lost life (Vejdirektoratet 2001; Finansministeriet 1999).

However, the payments from the fund would not truly be compensating those who actually loose the relatives, nor the victims themselves, of course. Instead, one might set up a kind of gambling situation with losers and winners. In this case the price or value is not actually put on the loss of human lives, nor on the pain and sorrow of loosing a relative, but instead on the *additional (or reduced) risk of loosing one's own or a relative's life* that one is (voluntarily) ready to accept in order to obtain a certain extra bonus, or "*the value of the reduced probability of death that is experienced by the affected population*" (Viscusi & Aldy 2003, 6). This is our third candidate, then. This candidate is coherent with the Kantian line of argument, because it does not involve inappropriate pricing of priceless entities.

The exact compensation for a loss of a human life would in this case be depending on the likelihood of loosing as well as on the extra benefit one expects to obtain. Consequently, it cannot be the same in all kinds of situations. As the risk gets higher and the expected benefit gets lower, the price goes up and vice versa. Not linearly, but exponentially. The first percent of extra risk will be less expensive than the next percent, and the last 5 percent between 95 and 100 will be impossible to pay. It is therefore important to notice in which part of the spectrum the incremental risk is placed.

Moreover, because the willingness to pay for risk reductions (or to accept risk increases) is fairly differentiated, not only across individuals (of different age, gender, health status, life quality, risk aversion, etc.) but also across income groups and cultures, it is quite problematic to use just one average measure of risk acceptance covering all risks in all situations at all places. The various surveys that have been made only tell about the indirectly revealed preferences in a given sample of people living under a specific set of circumstances accepting a specified kind of risk. These results cannot be generalized to a universal measure of a "statistical life" (Viscusi & Aldy 2003, 18), but are often used as such through so-called *value transfers* due to lack of time and money for differentiated studies (U.S. EPA 2000, 88).

If risks are imposed involuntarily, i.e., without a stated consent, the price ought to be significantly higher, of course (and the project should often be reconsidered). Other factors which affect risk perception are whether the risks are ordinary or catastrophic; occasional or continuous; immediate, delayed or latent; man-made or not; well-known or not; controllable or not; possible to avoid through averting behaviour or not; necessary or not (U.S. EPA 2000, 91; Pearce 2000, 12 & 18f). These dissimilarities make it even more problematic to make value transfers from one case to another, and even more so because the studies made so far are not very helpful in identifying the relevant factors that could explain significant variations between cases (Pearce 2000). If these factors were all well known, adequate adjustments

could, if only in principle, be made in cases of value transfer by the use of so-called *meta-analysis* (or other more informal methods).

The primary approach to estimating the value of an additional (or reduced) risk is *hedonic pricing*, first of all inferred from statistics on wages in jobs with higher than average mortality risks, but price-risk trade-offs for seatbelt use, cigarette smoking, automobile safety, bicycle helmets, etc. have also been studied (in so-called "averting behaviour" or "consumer market" studies). *Contingent valuation* methods have also been used. These studies can be designed in many different ways, some of which are not particularly reliable (for a comprehensive account of methods and accomplished studies, see Viscusi & Aldy 2003). The basic idea is to multiply the additional (or reduced) risk by the extra (or reduced) income. For example, if 1000 workers accept an extra wage of $5000 due to an additional risk of 0.001 percent, i.e., one of then can be expected to die during work, the value of a "statistical life" is $5 million (assuming, contrafactually, sufficient labour mobility and full information about actual risks).

Half of the U.S. hedonic labour market studies surveyed by Viscusi & Aldy found the cost of a "statistical life" to fall within a range of $5-12 million with a median of $7 million, but the studies vary significantly (Viscusi & Aldy 2003, 18ff). This is not far from the value recommended in the U.S. EPA *Guidelines for Preparing Economic Analysis*: $6.1 million (U.S. EPA 2000, 90). In the EU-sponsored ExternE-project the recommended value for "statistical lives" lost or gained within the EU is somewhat lower: €3.1 million, which is estimated on the basis of a survey of European studies (European Commission 1999, 232ff).

It is worth noticing that by far the highest risk in any of the surveyed studies were 0.2 percent; in most studies the risks were significantly lower. If the price on risks grows exponentially as the risks increase, the stated costs are only reasonable in low risk cases. At the same time the low risks makes people's behaviour quite unpredictable due to the difficulty of dealing consistently when confronted with such small numbers. Moreover, the studies only include the potential victims' own willingness to pay or accept, not those of their relatives, the inclusion of which may increase the value significantly (Pearce 2000, 26f).

It is also worth noticing that the willingness to accept risks is highly income-elastic; in countries with a lower average income than in the U.S. the costs of additional risks are lower. Several cost-benefit analyses of global issues, amongst which can be mentioned the ExternE-project, therefore adjust for this by multiplying the value of a "statistical life" by the ratio of the real

GNP (GNP adjusted for purchasing power parity) in each country to the real GNP in the EU (European Commission 1999, 236ff).

An important consequence of this highly controversial adjustment is that damages causing losses of human lives will be much cheaper in poor countries. In Rwanda, for instance, the value of a "statistical life" is estimated to €58.000, whereas a "statistical life" in Norway is worth €3.5 million or some 60 times as much. This is quite obviously a problematic conclusion, particularly because the inhabitants of Rwanda will not gain anything from having the negative impacts of climate change fall in their country (thus making costs cheaper), unlike richer countries with significant emissions of greenhouse gasses. It is worth noticing, too, that the value of a "statistical life" would increase with economic growth, wherefore losses or gains of lives cannot be discounted for the same reason as other costs and benefits.

The values from the described procedure could also be used in a calculation of an average *global* value of a "statistical life." This is the kind of calculation lying behind the EU Commission's DG Environment's recommendation to use a value around €1.0 million (2000 prices) with an upper estimate of €2.5 million and a lower estimate of €0.65 million (European Commission 1999 and 2001). This obviously reduces the costs of human lives in industrialized countries significantly without the consent of the people affected.

A fourth and a fifth candidate should be mentioned, if only in passing, namely *life-years lost* and *life-years remaining*. In both cases it is not life as such that is valued, nor the incremental risk of loosing it, but the expected number of life-years lost or gained. Although many of the issues already mentioned are relevant in these cases as well, there are a couple of important differences, too. First of all, age is more important in these cases. In the first case (life years lost) children's deaths are much more costly than the death of older people, because more life years are lost. In the second case (life years remaining) one can expect dissimilar reactions from people at different ages, particularly in cases of delayed and latent risks.

Generally speaking, there is no single value to attach to the loss (or saving) of a human life. There are various ways to estimate losses based on different sets of assumptions. Some of these differentiate considerably between different groups of people, due to differences in income, age, etc., whereas others seek averages. There is not one approach which is recommendable in all respects. This is not a result one should be sad about, however. It only makes it more obvious that it is a political task to make decisions – including the selection of which methodology (if any) to rely on.

Moreover, to talk about "the value of a life" or "the value of a statistical life" is bewildering at best (cf. also OMB 1996, 25f). The fact is that I have not come across any convincing arguments on how to monetise the loss of human lives. After all, it is only circumstantial matters that are monetised: the value of lost labour, incremental costs of medical treatment, the value of risk avoidance, the compensation of relatives, etc., not the loss of a human life itself. Nobody can be compensated properly for their own death. Consequently, when constructing a cost-benefit analysis one should always make a separate account of expected losses or gains of human lives.

The choice of exposing factions of citizens to increased risks due to the provision of a certain good is basically a social task, based on weightings of monetised as well as non-monetised costs and benefits, not simply an aggregation of individual accounts. Individual valuations can only give decision makers some hints about their willingness to back up decisions.

Monetising critical and unique resources

It is generally assumed in cost-benefit analysis that goods and resources can be substituted without limitation. *"If you don't eat one species of fish, you can eat another species of fish,"* as the American economist Robert Solow has put it, and if there are no fish left at all, you can eat something else. All resources are considered *"fungible"* (Solow 1993, 181); they can be replaced, and will be replaced without loss by others, whenever the price is right. In cost-benefit accounts it is therefore crucial to put the correct economic value on all kinds of resources in order to find the most economically sound solutions in cases of market failure.

There is one problem, though, which most economists recognize: the problem of critical resources, i.e., basic life-support resources like clean water or ecosystem stability (or resilience) which cannot be substituted for by anything else, and the loss of which may be irreversible or at least damaging for a significant period of time. This is a problem, which has turned up particularly in relation to the question of sustainability. Some hard core economists, supporting the weakest possible concept of sustainability, have argued that this is not a real problem, because the price of these resources will rise as soon as they become sparse. This is not altogether convincing, however. Partly because many decisions are made on the basis of a very short time horizon, from which future damages are not visible. Partly because some non-substitutable resources just do not come out in large numbers. Still, it is not an easy task to identify the critical resources, which are not likely to be preserved in an appropriate way by the market mechanisms (Turner &

Pearce 1993, Holland 1997, Holland 1999, Ekins et.al. 2003, Ekins 2003, De Groot et.al. 2003, Chiesura & De Groot 2003).

I have suggested that we distinguish between three kinds of resources as presented in *Figure 2* (Arler 2001 and 2003) Firstly, there are *exchangeable* resources, which can be substituted for by other resources, as long as there are enough of these with sufficiently similar qualities, without any further problems. The standard example is fossil fuels, which can, in principle, be substituted for by other energy sources. Nobody will miss coal, if there is energy enough to collect from other sources. Similarly, ordinary consumer goods are regularly exchanged and substituted for, and their value mainly depends on transitory needs and preferences. These are the kinds of resources whose destiny can be safely left to market mechanisms (or similar social devices) to determine.

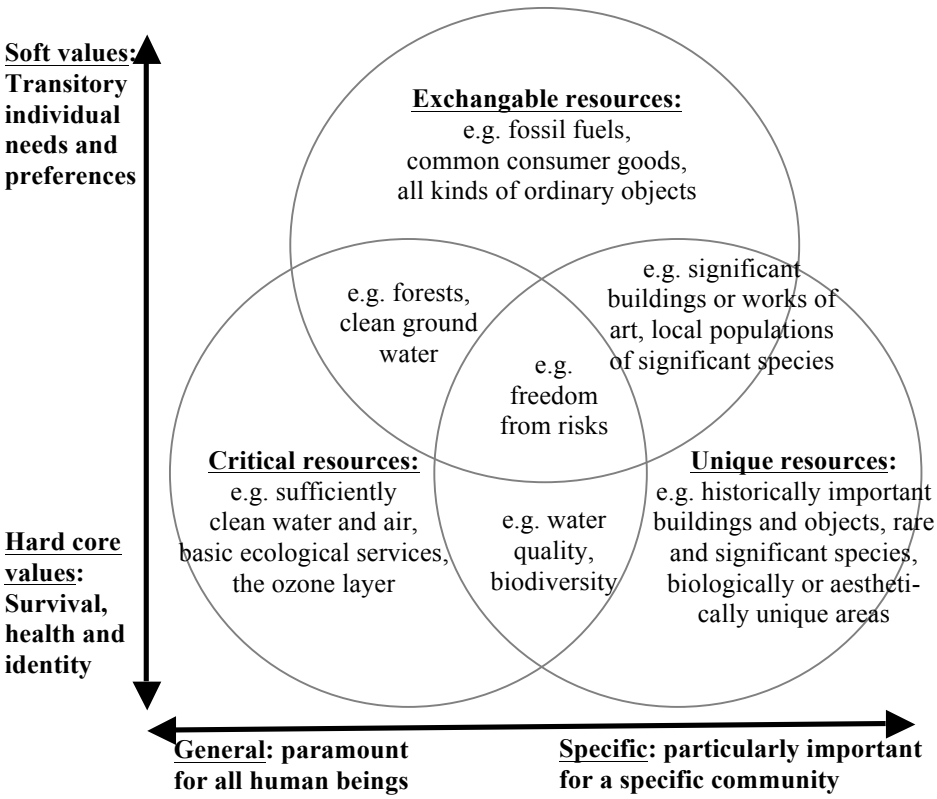

Figure 2: *The three kinds of resources: exchangeable, critical, and unique.*

Critical resources, on the other hand, are not so easy to do without, no matter which kinds of life style future generations are going to choose. Just like us, they will need sufficiently clean air and water as well as other basic re-

sources, which are fundamental to human beings as biological creatures. The line between exchangeable and critical resources is a fuzzy one, however, because it remains an open question to what extent precaution needs to be taken. How clean is sufficiently clean, for instance? How many risks are we willing to take – or rather: let future generations suffer from? These are to large extent cultural questions, and the answers very much depend on a specific culture's attitude towards risks and environmental quality. Similarly, although it is possible to survive as biological creatures with a fairly limited amount of resources, it may not be possible to keep up the living standards of today. In this sense the identification of critical resources depends on which baseline living standard is chosen. It also very much depends on local circumstances, unless it is assumed that people should simply move away from a locality, when resources, which are critical for human life in this area, are consumed or otherwise damaged. Finally, if the well-being of (some) others species are included in the concept of sustainability (Dobson 1998), this would expand the number of critical resources significantly.

The third category of resources is *unique* resources. These are resources, which are not indispensable for our survival as biological creatures, not even for a continuation of high living standards, but only for particular cultures' identity. They cannot be exchanged or substituted as simply as more ordinary things. Obvious examples are spectacular biological species or biodiversity in general, rare ecosystem-types, old and significant cultural creations, historically important sites, etc. Several of these are listed as heritage values on a local, national, or global level. Locally or nationally, there may also be a number of values, the fate of which is not left to be determined by private preferences. It may be decided, for instance, that preservation of clean ground water is considered to be so important for a specific community that it should not be submitted to pressure from market forces. This is the reason why it was decided in the U.S. of the early 70's not to use cost-benefit analysis before making policies related to the Clean Air Act, the Clean Water Act (Cropper and Oakes 1992, 675; Arrow et.al. 1996, 4) as well as the Endangered Species Act (Nash 1989).

Again, there is no clear-cut line between the unique resources and two other kinds. Some resources are certainly more unique than others, and the precise list is inevitably going to change along with the cultural changes in general. However, the basic point is that the identification of unique resources is a common – cultural and political – task, where due respect ought to be given to inputs from experts and connoisseurs, not a consumer issue. It is more related to the question of who we are rather than to what we prefer to have (Sandel 1982, 180). This is exactly the reason why unique resources are so difficult to deal with in cost-benefit analyses.

Monetization may not be totally out of the question, though. If an attachment of economic value appears to be appropriate for some good reason, it should not be based simply on the individual's private preferences, however. Instead, it should be the result of a common deliberation about a particular community's priorities, where everybody behaves as a citizen, and not simply as a self-interested consumer (Sagoff 1998). It should reflect what the citizens or their (ideally: well-informed and virtuous) representatives have agreed to consider important – or made compromises about – after an open process of deliberation in a Habermasian spirit, not an aggregation of what isolated individuals may happen to wish for themselves. Even though it is likely that there will be a certain amount of disagreement, and procedural justice therefore becomes a separate issue (Miller 1999), it is basically not a question about the quantity of supporting persons or feelings, but about the quality of supporting arguments. What is important, too, is to realize that this kind of valuation cannot be made once and for all; inevitably, it will change with the circumstances.

The distributive problem

Distribution within generations

As we saw in the previous chapter, cost-benefit analysis relies on the *potential Pareto-improvement rule* stating that policies and projects should be adopted if and only if the net benefits are positive, or, in accordance with the *Kaldor/Hicks criterion*, if and only if those who are likely to gain from it can be expected, in principle, to be able to compensate those who are likely to lose, and still be better off than before.

The potential Pareto-improvement rule or Kaldor/Hicks criterion both appear quite appalling. How can the potential compensation of victims be used as a justification, if the victims are not actually compensated? There is also a great amount of build-in conservatism in cost-benefit analysis. Due to the fundamental and sovereign criterion of potential Pareto-improvement, status quo, the existing equilibrium is used as baseline, no matter how inequitable this may seem. If, to use an extreme example, a society is dominated by a few very rich companies or individuals, due to some dim occurrences in the past, whereas the rest of the population live in extreme poverty, a cost-benefit analysis would recommend a project which made the oligarchs so much richer that they could, in principle, compensate the losers among the poor people. Whatever happened before the present situation is considered as "sunken" costs and benefits and not included in the calculation.

The potential Pareto-improvement rule or Kaldor/Hicks criterion are usually defended by the following arguments (cf. Boardman et al. 1996, 32f). Firstly, when society as a whole becomes richer the worst off members of society are likely to benefit. Even if a more unequal distribution results from using the rule in a certain case, the poorest members of society will still be better off than they would have been without this application. If a more equal redistribution is wished for, this will be easier to accomplish separately when society becomes richer.

Secondly, different distributions will typically result in different sets of winners and losers, and if the economy as a whole grows due to the use of the potential Pareto-improvement rule, there will be more places where one can win. The average agent is an obvious winner, but even poor people can be expected to be able to improve their situation.

Thirdly, if actual compensations should be provided in detail from every winner to every loser, this would result in huge transaction costs. In most cases they do not know each other, and typically it is not even obvious who is affected, neither *ex ante* nor *ex post*, due to unclear lines of causality, uncertainty about the baseline case, etc. A vast bureaucracy would be needed in order to record not only each and every single cost and benefit separately but also exactly where, when, and on whom they fall, and to guarantee that the transfers were actually carried out.

These are all quite reasonable arguments under certain circumstances. Their validity depends, first of all, on the actual presence of welfare regulations that deals with serious distributive consequences otherwise (Campen 1986, 40). This is not always the case, of course. So, even though, theoretically, everybody may have a better chance of improving his or her situation when the economy is thriving, it is still necessary to give decision-makers a clear picture of where the costs and benefits are landing. Moreover, cost benefit analysis cannot abolish the rights of citizens, including private property rights, and compensation claims are often unavoidable.

In cross-national settings, where no regular compensatory mechanisms are operational, the use of the potential Pareto-improvement criterion becomes even more controversial. If all impacts of a certain project are placed in poor countries, where costs – including "statistical lives" – are cheap, while all benefits are moved to members of rich countries, this may be an improvement when measured in economic terms, but would appear offending in most people's opinion.

Even when no-one's legal rights are threatened by a project or policy, it is still important to identify winners and losers. If, for instance, disproportion-

ately high costs of a project or policy are borne by a limited group of people, maybe even some of the worst off people in society, this would in itself be a good reason for changing or rejecting the project or policy. This is also reflected in the economic assessment guidelines of the U.S. OMB and EPA (U.S. OMB, 16; U.S. EPA, Chp. 9) as well as in the U.K. *Treasury Green Book*, although none of these recommend a specific methodology. Both sets of guidelines are open for the possibility that various groups or sub-populations are weighted differently in impact assessment analyses, on the basis of separate equity assessments. Local costs and benefits, or costs and benefits falling on particularly disadvantaged people, for example, may thus be given more weight in the account. The identification and definition of relevant sub-groups is not an easy job, though, as can be seen, for instance, in the attempt to set up a framework in the *U.S. EPA Guidelines*.

It does not always make a case better, if real (instead of potential) Pareto-improvement is used as criterion. Sometimes this may actually worsen things. The reason is that questions of equity typically are ignored in cost-benefit analysis. For instance, in some assessments of what would count as reasonable policy reactions to the increasing greenhouse effect it is assumed that status quo and 'normal' economic development function as baseline for negotiations. In this case any cut in the use of fossil fuels in order to slow climate change would hurt countries like Saudi Arabia, USA, Russia or China with large deposits of oil, gas, or coal. According to the actual Pareto-improvement scheme these countries should be compensated for their losses – as is often the case when agreements are international (Azar 2000). Who should compensate them, then? The winners, of course. Who are they? Those countries, or individuals, who benefit from the abatement, i.e., the poorest people who do not have enough economic and technological means to avoid the negative impacts of an increasing greenhouse effect.

Another distributive problem related to cost-benefit analysis is that willingness to pay is depending on ability to pay. Wealthy people's wishes count more than poor people's wishes. The standard justification is, firstly, that this just reflects the situation on the market, which cost-benefit analysis is supposed to imitate. If this is not equitable, it has to be dealt with otherwise. Secondly, in many cases the sheer number of people influencing the market situation tends to diminish the influence of particular groups (Marshall 1920/1946, 19).

Still, it is necessary to assess whether this argument is applicable in each particular case. This leaves us once again with two ways to deal with the problem in relation to cost-benefit analysis. Either one can argue that cost-benefit analysis should not pay much attention to this problem, but stick to its standard methodology and leave it to the decision-makers to take care of

the problem otherwise, or one can insist that this concern should be reflected explicitly in the analysis, for instance, by valuing the poor individual's extra dollar higher than the rich individual's.

Distributions across generations

There are several issues where the gainers and the losers, the tortfeasors and the negatively affected parties, are situated in different generations. The increasing greenhouse effect is the most obvious example, but there are many others: irreversible losses of biodiversity, radioactive waste from nuclear plants, losses of non-renewable resources like fossil fuels, ground water pollution, etc.

It is worth noticing that when we are talking about equitable distribution across generations it no longer makes sense to use the *homo economicus* construct exclusively as starting point. If everybody acted as egocentric busybodies only looking for mutual advantage contracts, future generations would be the first to loose (Barry 1989, 189ff). They will never be able to do anything for us, nor will they ever be able to harm us in any serious way. It has been argued, though, that the relation between generations can be conceived of as a contract involving three currently living and equally selfish generations (Gauthier 1986), and that the different generational interests would balance each other in a way similar to the equilibrium of opposing interests on the market. However, if everybody really were as selfish as it is assumed in economic calculations, it would be quite obvious to drop all obligations to future people a number of generations away. In this case it would be easy to ignore problems that could be kept away for a certain amount of time.

According to Layard & Glaister this is actually the position of most economists, who are only willing to judge projects in terms of present welfare effects. Layard and Glaister themselves support the opposite view that cost-benefit analysis "*aims to throw light on what is right*," and, accordingly, cannot find any excuse for ignoring future generations (Layard & Glaister 1996, 33). A parallel distinction can also be found in the chapter on intertemporal equity and discounting in the IPCC Working Group III report from 1996 (Arrow et.al. 1996): the so-called "*descriptive*" approach begins with evidence from actual decisions, whatever ethical positions these may happen to express, whereas the so-called "*prescriptive*" approach begins with ethical considerations. This way of constructing the difference is somewhat confusing, however, because the so-called descriptive approach actually does take a specific ethical stance. It is simply using the potential Pareto-improvement criterion in a cross-generational context, despite the obvious lack of direct compensatory mechanisms. In general, the supporters of this approach are

assuming that a continuous economic growth will be in the interest of future generations as well.

All differences apart, all parties do agree that future costs and benefits should not count as much as current ones. Future net benefits should be *discounted* in order to find the *net present value*. Estimated future costs and benefits are accordingly decreased in current calculations by a *discount factor* $1/(1+r)^t$ where r is the *discount rate* and t is a time index.

Several reasons have been put forward in defence of this claim. Firstly, it is argued that somehow we have to reduce the influence of future consequences on current decisions. Otherwise, the sheer weight of costs and benefits of an infinite or at least extremely vast number of future people may happen to be so colossal that impacts on present generations would count next to nothing, and the required savings rate would become "absurdly high" (Arrow 1999). By discounting future impacts, current people's interests become more visible in the calculation. Discounting all kinds of future consequences without differentiation is a way too high prize to pay on this account, however. This argument is obviously based on some equity consideration which is foreign to the basic utilitarian assumption of cost-benefit analysis that maximisation of utility is the basic goal, no matter how costs and benefits are distributed. A hard-core utilitarian would have to say: yes, present generations will suffer from the burden – so what?

But even if equity considerations are included, giving due respect to all generations, social discounting may not be the right answer to the problems of the current generation. One of the basic points in "doing the right thing" in relation to cross-generational issues is to preserve the spectrum of attractive opportunities in order to keep up the possibility of welfare (or a good life) for time to come. This point is totally blurred if all future consequences – including, for instance, losses of future lives – are discounted by the same factor.

Secondly, it is assumed that people in general prefer to have current needs and wants satisfied rather than those they may have in the future. People are believed to be so impatient that they are not willing to save as much for the future as a cool calculation would advise them to do. This is usually referred to as the *pure time preference* argument, and is often transferred from the individual level to society at large. For example, the U.K. Treasury refers to it in the following naïve way: "*Society as a whole* (sic!) *prefers to receive goods and services sooner than later, and to defer costs to future generations*" (U.K. Treasury 2000, 26). This statement is justified by reference to people's present market behaviour. It appears almost democratic, then, to take account of these preferences. The truth is that it is not democratic at all.

Firstly, consumers' selfish behaviour should not be confused with that of responsible citizens. Secondly, the opinion of future people (or their current advocates) on the issue are not included even though they are obviously part of the same "society as a whole."

The pure time preference argument is not convincing even for individuals. Of course there are individuals with a short planning horizon, or people who believe that their self at time t_0 is so different from the future self at time t_1, that this is actually a different person, whom the self at t_0 only feels partly responsible for. But from a societal point of view, why should the person's needs (or preferences) at t_1 be less important than the person's needs at t_0? The argument loses all credibility in the case of cross-generational distribution, where costs and benefits fall on different sets of people, who are all part of the same "society as a whole" although with different locations on a time line.

Thirdly, technological improvement and economic growth in society is likely to make people richer in the future, at least in the near future, and at least in terms of consumer goods. If future people are expected to be richer than we are, it may not seem equitable that we should use large sums to improve their welfare further, for instance, by avoiding unfortunate environmental impacts. Moreover, if we could invest our money in projects that are more profitable, this may be to the advantage of future people, too. Consequently, there should be some proportion in current people's effort; future people's costs should be seen in relation to their presumably higher income, which may be assumed also to result in a lower marginal utility of each extra gain (unless it is believed that future people are more difficult to satisfy due to more expensive tastes which current people ought to support). Future costs and benefits should be discounted, accordingly, at the expected rate of economic growth or growth of consumption (g) multiplied by the presumed elasticity of marginal utility (θ).

This argument, again, is an argument from equity. It is also an argument, however, which is based on assumptions that may happen to be quite precarious. Whereas it is true that the general trend for several hundred years has been one of economic growth, it is no longer quite as obvious that this trend will continue to be dominant hundreds of years from now. After all, several of the key resources in the current period of exceptional economic growth have become more difficult to extract; fossil fuels being the primary case. Although science and technology can be expected to continue to improve, and thus to be finding new means and paths, the sheer size of an economy several times bigger than the current one makes the whole scenario rather incalculable – with an interest rate of 6 percent (quite common in cost-benefit calculations) we are talking about an economy some 18 times bigger

then the current one within half a century. Not even a radical decoupling of economic and material growth would seem to suffice. Moreover, even though future people may happen to be wealthier in terms of consumer goods they may also be poorer in terms on non-monetised goods. The argument thus assumes that each and every good can be substituted for. Finally, if the expectation that future people will be richer is used as an argument for discounting, consistency would obviously demand that richer people in general should count less in cost-benefit analysis. Otherwise, two separate issues – the issue of obligations to future generation and the issue of distributive inequality – are all too easily getting mixed up in an improper way.

Fourthly, it can be argued that current people care less and less about future people the further away these people live, because we know less and less about who they are and what they cherish. In the long run, our effort to improve the conditions of future people may not hit the target at all, because they may not share our values or preferences. The effort should therefore not have the same priority as efforts to help current people who can be asked about their needs and wants. People in the far future can be compared to people on the other side of the globe or to current people with a way of life very different from our own. There seems to be an *empathetic distance*. Discounting their costs and benefits could be seen as a reflection of our lack of interest due to the plausible diminishing compatibility of our and their cultural values.

This argument may seem to be strengented by the fact that, in certain cases, a large part of the beneficiaries will be descendants of current people of the third world. There will be relatively more people in these countries in the future, and these people will be more vulnerable to climate change than future rich people in the industrialized countries. Policies of greenhouse gas mitigation, in particular, may thus be likened to foreign aid programs (Schelling 1999). If we do not give much support to poor people in other countries today, why should we support their probably somewhat richer descendants more thoroughly? If we actually want to make sacrifices in order to give more help to the poor people of the world, why not invest in immediate improvement instead? If this leads to economic development today, future people in these parts of the world would also be less vulnerable to climate change.

At least two arguments can be put forward against this kind of reasoning. The analogy between future people and current people with a different culture is misleading at one point: we are not directly responsible for the fate of current people in other parts of the world, whereas we do hold the destiny of future people in our hand. Responsibility matters. Moreover, we do have the possibility of influencing future culture to a larger degree than current cul-

ture in foreign countries. They may not be as foreign to us as the argument assumes, but should rather be seen as descendants of a common culture of argument. It should be noticed, also, that this line of argument is more suitable for communitarians (de-Shalit 1995) than for economists working in the neoclassical tradition, trying to reduce common values to private preferences. For them emphatic distance cannot be an issue, and, consequently, no serious reason for discounting future costs and benefits.

A fifth reason given for discounting is that future costs and benefits are more uncertain. Unforeseeable events like war, natural disasters, etc. may happen to change the whole scheme. Likewise, if we do a lot for the far future, we cannot be sure that the generations in between will not do what mainstream economists expect them to do: look at their own advantage and let go of the generations further down the road. The further away in time we look the more probable it is that something will be happening in the meantime. Discounting may appear to be a solution to this problem, because it reflects the diminishing ability to foresee the situation of future people. A problem with this solution is that it confuses two separate issues: the risk of future benefits and the length of time until they materialize (U.S. EPA 2000, 37; Møller 2003). Not all current investments are equally risky, so this can hardly be the basis for the use of a general discount rate, which works from day one.

Short-term discounting cannot be equalized with long-term discounting. In the second case the use of even a modest discount rate will erase remote impacts from current accounts. For this reason several authors have suggested lowering the discount rate over the years until it is close to zero in the distant future (cf. several contributions in Portney & Weyant 1999; U.K. Treasury 2000). One problem with this approach is that it easily leads to the so-called *time inconsistency problem*: the discount rate would have to be changed every time a new planning process begins, and the rate in a new plan would necessarily contradict those in older plans. This does not appear to be too much of a problem, though. A more radical solutions would be to drop some of the basic assumptions in cost-benefit analysis altogether in relation to decision making in cases like the increasing greenhouse effect, where the most serious impacts can be expected to lie in the far future, and concentrate on the basic questions of equity instead (Lind & Schuler 1998).

The question of discounting is handled very unevenly by different institutions and analysts. The U.S. Office of Management and Budget recommends a discount rate of 7 percent (U.S. OMB 1992 and 1996), but in the latest draft of new guidelines they recommend to use a 3 percent rate as well (OMB 2003). The U.S. EPA recommends a general 2-3 percent rate for intra-generational discounting (equal to the historical records of the consumption rate of interest). It is also recommended that a 7 percent rate is used in

sensitivity tests, together with a "no discounting scenario" (without value summation) in relation to inter-generational issues like the increasing greenhouse effect (U.S. EPA 2000, 48 and 52). The British *Green Book* recommends a short-term (<30 years) discount rate of 3.5 percent, calculated on the basis of a) pure rate of consumption together with catastrophe risk: 1.5 percent, plus b) the annual growth in per capita consumption: 2 percent; in relation to long-term effects it is recommended to use a declining discount rate (U.K. Treasury 2000, 97ff). All of this is significantly lower than recommendations from previous Treasury guidelines. The ExternE-project recommends a 3 percent discount rate (using 0 and 10 percent rates in sensitivity tests), but uses other rates in certain situations (European Commission 1999, 64f). The Danish Ministry of Finance recommends a general discount rate of 6 percent (Finansministeriet 1999, Appendix C), based on estimates of the opportunity costs of capital, i.e., the missed potential returns from present alternative (private) investments. Reports from the Danish Ministry of the Environment, on the other hand, recommend a discount rate of 3 and 2 percent respectively, but it is also recommended that projects should yield an effective dividend of at least 5 percent (Møller et.al. 2000, Møller 2003).

The next question to turn up is this: should all costs and benefits be discounted at the same rate, or should some costs or benefits be treated separately? If future people are actually going to be as rich as it is assumed by analysts, who prefer a high discount rate, this will undoubtedly influence the combination of preferred goods. Let us assume, for the sake of argument, that people living a couple of hundred years from now are going to be ten (or more) times richer than current people (in industrialised countries), as the use of even a fairly low rate of interest would imply. In this case it seems quite absurd to think that they are simply going to want ten times as many cars, washing machines, and egg boilers as today. Even if we assume that ordinary resource shortages are not going to prevent them from having these items (and this may happen to be a shaky assumption), is seems quite obvious that the preferred combination of desired goods will change.

For instance, it seems likely that areas with a modest human impact and high biological diversity will be scarce in the future and therefore also economically valuable. This is a pattern already observed to some extent in current industrialised countries. Should this not be reflected in cost-benefit analysis, for example, by excluding these kinds of goods from discounting? The U.S. Office of Management and Budget recommends that these two issues are dealt with separately (U.S. OMB 1996, 12), whereas others recommend that scarce environmental goods are exempted from discounting (U.K. Treasury 2000, 25) – or even discounted at a negative rate.

Another issue which could be dealt with separately is potential losses of human lives. If we assume that these losses are monetised as "statistical lives," and that a discount rate of, say, 5 percent is used, one life lost today would count more than 100 lives lost a century from now. Methodology apart, it is not obvious at all what could make this right. Similarly, a foreseeable catastrophic event in the far future cannot be treated on a par with some minor welfare changes over a long period.

The choice of discount rate has significant impact on the assessment of long-terms projects and policies. There is not one single rate which can be recommended without further qualification. In relation to intergenerational issues the choice is basically a matter of equity. When a high rate is chosen this is usually done on the basis of very optimistic assumptions about continuous economic growth and unlimited substitutability of resources – often combined with a lack of interest in the destiny of future people (disguised as a high "societal pure time preference"). On the other hand, the choice of a low rate (in general or in relation to specific goods) signals less optimism, more concern for futurity and/or for preservation of critical and unique resources. The use of several different rates (at least in sensitivity tests) designates that this is not a question which is appropriate for economists to deal with on their own.

The use of cost-benefit analysis

Cost-benefit analysis is grounded methodologically in the private society conception, which sees society as a mutually beneficial aggregation of private consumers who all try to maximize the satisfaction of their own preferences, whatever these may happen to be (Rawls 1973). The market is the basic model for social relations, and interventions in the market are not considered appropriate, unless some kind of failure appears, which cannot be dealt with otherwise. Even in these cases the market should be imitated as far as possible.

However, society is something else, too. It is just as much a union of unions (families, associations, communities, nations, etc.) working together in a common effort to further the good life, the identification and refinement of which is one of society's main tasks. Commitment, equity, and quality are key concepts here. Seen from this angle the market is only one out of a number of types of social organisations, each of which is appropriate for a specific set of purposes. Like any other kind of social organisation, it is in need of a permanent evaluation and justification. It has its strengths, but also a series

of weaknesses, wherefore it should be kept within proper confines. Wherever it can be shown to further the good life it should be applauded; wherever not it should be limited in a reasonable way.

In the first conception, the *private consumers* (or should we rather say: their self-regarding preferences) are always considered sovereign – even in cases that cannot be dealt with properly by the market. Where markets fail, cost-benefit analysis moves in and estimates what would happen if, contrafactually, the market mechanisms were capable of doing their normal job. In the second conception, the primary agents in social affairs are the *citizens*, who are expected to take the viewpoint of society at large throughout their deliberations. According to this second conception one of the citizens' most important regular tasks is, in general as well as in each particular case, to identify the borders between what must be considered private and social affairs, respectively.

Some cost-benefit analysts tend to believe that the private society conception is an altogether adequate image. Most analysts do seem to be aware of several of its shortcomings, however, but consider it to be a reasonable proxy, which can be used methodologically to enlighten and improve citizens' and decision makers' treatment of complex issues. They recognize the need to take into consideration other concerns, which cost-benefit analysis is not suited to deal with, but insist that many issues can be treated much more systematically by means of economic analysis.

Even in cases where impacts are difficult to monetise, cost-benefit analysis can deliver a framework, which makes it possible to deal with these issues in a systematic way. The U.S. EPA, for instance, argues in the following way: "*Benefit-cost analysis is not a precise tool that yields firm numerical results, rather, it is a general framework for more carefully accounting for the potential and varied effects of government programs. Some of these effects can be quantified, whereas others can only be assessed qualitatively. Some may be relatively certain, whereas others may be quite speculative*" (U.S. EPA 2000, 33). Despite all its weaknesses, the analysis does contribute to the decision making process by way of its methodological grip on most significant components of an issues.

On the other hand, critics do have a number of serious objections against the growing use of cost-benefit analysis in decision making, several of which have already been mentioned.

- A basic problem is the confusion of consumers and citizens. Social affairs are treated as private affairs. Political decisions are treated as if they were market decisions.

- Due to factors like lack of information, fallacies and misconceptions, self deception, lack of clarity about goals and measures, individual preferences are seldom clear, continuous, or well-founded. Yet they are regarded as the sole basis for cost-benefit evaluations.
- On the market decisions are taken individually in a *series*, not collectively in a *group* (to use Sartre's expressions). This often leads to problems of sub-optimality, as is well-known from examples like the prisoners' dilemma. Yet it is assumed in cost-benefit analysis that common decisions should be aggregations of individual decisions.
- Non-marketed goods are monetised, even though several of these goods are kept away from the market deliberately, as is the case with human lives and unique resources.
- Equity issues are to a large extent ignored in cost-benefit analysis. This is the case with the baseline scenario as well as with the distribution of impacts. The institutional setup, which determines how the market works, is beyond critique. Wealthy persons' wants count more in cost-benefit analysis than those of poor people.
- Cost-benefit analysis is unreliable in long-term predictions due to the changes in valuation occurring along with the alteration of the situations in which the valuations occur.
- All too often basic assumptions are hidden in a methodological framework, which is not easily seen through, if one is not familiar with economic analysis.
- The scientific and quantitative presentation is seductive and deceptive, because it signals a higher degree of certainty than cost-benefit analysis can actually achieve.

As we have seen above, some of these problems can be reduced in various ways. Assumptions can be stated more explicitly. More emphasis can be put on sensitivity tests. Uncertainties can be underlined. Qualitative components can be integrated in the analysis. Problems of equity can be given a more prominent position. Yet some of the basic problems cannot be dealt with this way.

Many economists argue that it is inappropriate to criticise the use of cost-benefit analysis by comparing it with an idealised democracy, where everybody's voice is heard equally, everybody yields to the best argument, etc. (cf., for instance, Boardman et.al. 1996, 46; Turner 1979). Firstly, they point out, this is not how actual governmental processes works. The powerful interest groups are the ones who are listened to. Power all too often overrules arguments. Cost-benefit analysis reveals the interests of less powerful groups and includes them in decision making procedures.

Secondly, even though each individual's preferences are seldom clear, consistent, and well-founded, the large number of people's preferences included in the analysis tends to make up for this. What cost-benefit analysis can do is to give important hints to decision makers about proportions and priorities. If conclusions are fairly clear, even after a sensitivity test has been made, this is in most cases a very good indication that the case in well-founded.

Thirdly, even though monetisation of externalities is shaky business, it is important to include these estimates, because otherwise environmental benefits are easily forgotten. Without economic values on non-marketed goods, only the (often: high) costs of preserving goods like nature sites or reducing health risks are left out in the quantitative part of the account. And accounts in monetary quantities often appear more convincing to policy makers than qualitative descriptions of phenomena, the importance and proportion of which can be difficult to estimate.

Finally, cost-benefit analysis has much less influence on decision making than the critics assume. It is difficult to identify just one decision made solely on the basis of cost-benefit analysis. Cost-benefit analysis should be considered as one among several tools, which decision makers can use. Other concerns may overrule the results of cost-benefit analysis, or other tools may be more adequate in certain situations.

Methodology cannot replace ethical judgement. In the end ethical and political decisions have to be made on the basis on many at least partly incommensurable factors. Cost-benefit analysis can often improve decision making due to its systematic treatment of the issue at hand. This is particularly true in relatively limited cases, which mainly include goods that are traded on markets. One needs to be very careful about its use, however, and even more so in more comprehensive cases, which involve several non-marketed costs and benefits, or where long time impacts play an important role. Cost-benefit analysis can be very seductive, indeed, and one of the main virtues, a decision maker needs to have, is to be resistant to its magic in order to handle it with an appropriate amount of care and caution.

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